DIY

Worthwhile projects you can build on your own

2-meter Two-element Collinear Antenna

Seems like most of us spend much of our ham radio time on 2 meters, and rightly so. That's where the most popular radios transmit, and where the most popular repeaters reside. Furthermore, most of our area, neighborhood, city, ERC, and county emergency and preparedness nets are assigned to 2-meter frequencies in our county. It's been months since we've addressed a 2-meter antenna, so let's go back to our roots, and examine how to build one. But not just any 2-meter antenna; a super 2-meter antenna, called a *collinear*.

All due respect to Carl and his wonderful J-pole, this little gem will actually outperform his antenna because it'll get your signal out farther due to its higher gain. The big advantage that the Pockrus J-pole does have over this one, however is that it supports 70 cm as a dual-band antenna, while this collinear antenna is meant only for 2 meters. Also, a collinear will typically be twice as long or more, than Carl's antenna, another possible disadvantage. Still, if 2 meters is pretty much what you do, and you need to hit West Valley City on simplex from Orem, this might be what you're looking for. The collinear design is attributed to Steven Merrill KB1DIG.

A collinear antenna means that it is actually more than one antenna *stacked* on each other, but 1) all working *in line* with each other and 2) all *in phase* with each other. Also, this design is for two 5/8-wave antennas (hence the name *two-element*) that are *in phase* with each other, so they're connected by a *phasing stub*.

Here's the list of parts (not much to this antenna):

161 1/2″ of 6 AWG solid copper bare wire

1 x 10-foot 1″ Schedule 40 PVC

1 x 1″ PVC slip cap

2 x 1″ PVC coupler

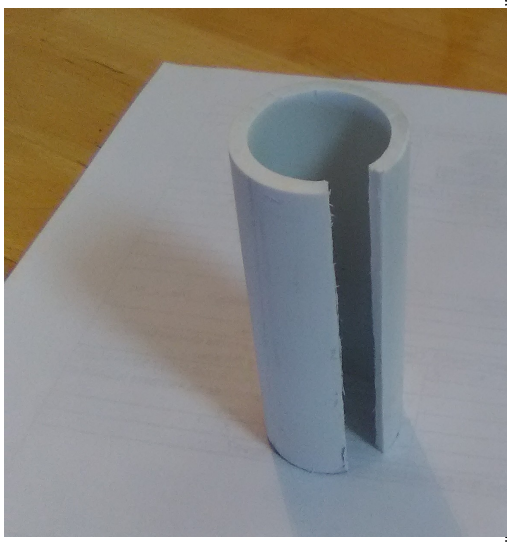
3 or more feet of RG-8X coaxial cable (preferably with a BNC or SO-239 connector on one end)

2 x 3/4″ 4-foot wooden dowel

Zip ties

Cut off a 3 5/16″ section of the PVC, then cut a 3/16″ wide groove into it lengthwise. Cut off another 47″ section of the PVC. Place the slip cap onto one end of this 47″ section and one of the couplers on the other, forming the top section. Cut off another 64 1/4″ section of the PVC and place another of the couplers on one end, forming the bottom section. Drill a large-enough (5/16″ to 3/8″) hole in the bottom section about 4 1/2″ from the end without the coupler, for the shield to exit, so that it could be soldered to the big wire later.

PVC slip cap



Grooved PVC section

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The phasing stub

After reasonably straightening the 6 AWG wire, bend the first right angle 47 1/2″ from one end, which will serve as the top end. Bend a second right angle in the other direction 13 3/4″ from the first right angle. Bend a third right angle in the same direction 1″ from the second right angle. Then bend a fourth right angle in the other direction 13 3/4″ from the third right angle. This should create a three-sided rectangle, known as the *phasing stub*, as shown here.

The phasing stub

Assemble the main body

Strip your coax back about 1 1/2″ and solder the center conductor to the big wire 61″ below the fourth right angle. Twist the coax shield into a rough braid, then tin the shield braid with a little solder. Slide the top section (47″ PVC, plus cap and coupler) down over the top wire. Slip the small, grooved PVC section onto the big wire, so that the phasing stub sticks out of the groove. Slide one of the wooden dowels into grooved PVC section, so that about two feet sticks out of it. Join the top section to the grooved section with PVC glue.

Slide the bottom section (64 1/4″ PVC, plus coupler and coax) up over the bottom wire and dowel, and orient the bottom section so that the 5/16″ hole is on the same side as the phasing stub. Join the bottom section to the grooved section with PVC glue. Wrap two zip ties around the grooved PVC section but between the two parallel runs of the phasing stub, to keep the runs an inch apart. Reach into the 5/16″ hole with a pair of needlenose and fish out the shield braid.

Matching stub assembly, showing the shield hole

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Matching stub

About 1/2″ below the bottom section bend the big wire at a right angle in the same direction as the phasing stub. Then 1″ past the right angle, make another right angle in the big wire, so that the remaining portion of the big wire is pointing straight up toward the phasing stub, just outside the bottom PVC section. Solder the shield braid to the big wire just outside the 5/16″ hole. Place a small piece of heat shrink tubing over the end of the exposed big wire, to prevent injury.

Insert the second wooden dowel into the bottom section, leaving about six inches protruding from the bottom section. About 1/2″ below the bottom of the big wire wrap three turns of your coax around the wooden dowel and secure it with zip ties.

At this point, if the other end of your coax is terminated with an appropriate connector (I used a BNC male), you're ready to get it on the air. The total length of the assembled antenna is about 10 1/2 feet. When you go to mount it, you might find that center section to be little weak, so you'll need to guy the antenna with paracord or similar. Just bolt the wooden dowel to a sturdy mast.

Lengthwise view of the finished product

Tigger, overseeing the work

This antenna should yield about 6.5 dBi, and handle up to 200 watts. Its antenna pattern should look like a flattened donut. But when you use it, you'll probably be sitting pretty, being able to get your signal out far, hear far-away stations...on simplex!